On a Collection of Mammals from the Natuna Islands, South China Sea

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The history of zoological exploration in the Natuna Islands has been summarized in two papers by Gerrit S. Miller[1] Jr., and Harry C. Oberholser.[2] Therein are bibliographies and general accounts of the island groups with, in the latter case, a map, all of which it would be superfluous to repeat, at so short an interval, in this place.

It remains to be recorded that V. Knight, late of the Raffles Museum, went to the islands for a short visit in November 1907 and made small collections on Sedanau, Bunguran and Midai: he revisited Bunguran for a few days in April 1909. No complete account of the material obtained has ever been published, and notice of a few of the more interesting mammals is therefore included below.

The next collection of mammals was made by myself. Taking advantage of facilities kindly offered by the Government of the Netherlands Indies I left Singapore on 16th August 1928, accompanied by three native collectors. We landed on the west coast of Bunguran, or Great Natuna Island, and collected from two camps, (20th August—12th September), one at Kuala Binjai, opposite Tanjong Belitong; and the other a short distance up the Binjai River which enters the Penarik River on its right bank near the mouth. These places are on the west side of Bunguran, facing the smaller island of Sedanau on which collecting was also carried out (13th—25th September). Several islets off the west coast of Bunguran were also visited. As I was unable to visit the southern islands of the group, Mr. P. M. de Fontaine, of the Raffles Museum, and three native collectors went there in 1931 (July—September) and collected on Sirhassen, Panjang, Berian and Subi.

The northern and southern groups of islands are by no means alike in their mammalian fauna. The southern group is essentially Bornean in its affinities. This relationship is primarily indicated by the presence of *Tarsius*, and *Tupaia tana* on Sirhassen Island, and is emphasized by the *facies*

1. "Mammals Collected by Dr. W. L. Abbott on the Natuna Islands", Proc. Wash. Acad. Sci., III, 1901, pp. 111-138.

2. "The Birds of the Natuna Islands", Bull. U. S. Nat. Mus., 159, 1932, pp. 1-137.

of the local forms of *Ratufa affinis*, *Tragulus kanchil* and *Tragulus javanicus*. The northern islands are also linked to Borneo by *Mydaus* which occurs in both places, but in general, the subspecies of Bunguran are dissimilar to those inhabiting the nearest Bornean mainland. In a number of cases they bear a strong resemblance, hitherto unrecognized as a general factor, to the races on Bintang Island in the Rhio Archipelago. Such are *Tupaia glis natunae*, *Rattus rattus luxuriosus*, *Sciurus notatus rubidiventris* and *Tragulus kanchil everetti*.

The present collection has enabled us to extend the range of some species within the island group. Specimens of the following mammals are recorded for the first time from the Natuna Islands.—*Rattus whiteheadi*, *Tarsius*, *Macroglossus*, *Rhinolophus trifoliatus*, *Hipposideros galeritus*, *Hipposideros diadema*, *Myotis adversus* and *Crocidura aagaardi*. The following subspecies of species already known to occur in the islands are also added to the fauna.—*Rattus surifer lingensis*, *Rattus mülleri firmus*, *Megaderma spasma trifolium* and *Rhinolophus borneensis nereis*. Furthermore, I have ventured to describe as new.—

Rattus rattus luxuriosus subsp. nov.
Rattus sabanus bunguranensis subsp. nov.
Tragulus kanchil abruptus subsp. nov.
Tragulus javanicus abjectus subsp. nov.

Pygathrix pyrrha vigilans (Miller).

Semnopithecus cristatus, Thos. and Hart., Nov. Zool., I, 1894, p. 654 (Sirhassen); Miller, Proc. Wash. Acad. Sci., III, 1901, p. 138 (Sirhassen).
Presbytis vigilans Miller, Smiths. Misc. Coll., LXI, No. 21, 1913, p. 29 (Sirhassen Island, South Natuna Islands).

Sirhassen, 2 ♀.

This race was described from two skulls and the racial character given by Miller, like "other members of the *cristatus* group but region between narial aperture and middle of frontal more sloping" is confirmed by the present specimens as a good *average* character[1]. A few "*cristatus*" skulls in a long series are similar to *vigilans*.

In general colour the Sirhassen skins are very near an exceptionally dark example of *P. p. ultima* from Perak, Malay States, but much darker than normal well silvered continental animals. *P. p. vigilans* is also very close to some pale examples of *P. p. pullata* from Bintang Island in the Rhio Archipelago,

1. The greater *apparent* width *i.e.* that visible from above, and not the actual width (as supposed by Mr. Pocock in P.Z.S. 1934, p. 935) is a corollary of the more sloping face.

but the limbs are not so dark as in *pullata* though darker than the Perak example mentioned above.

(For measurements *see* page 30).

Pygathrix siamensis natunæ (Thos. and Hart.).

Semnopithecus natunae Thos. and Hart., Nov. Zool., I, 1894, p. 652 (Bunguran); II, 1895, p. 489 (Bunguran); Miller, Proc. Wash. Acad. Sci., iii, 1901, p. 138 (Bunguran).

Bunguran, 1 ♂, 2 ♀.

The three skins listed above are fairly uniform in colour. One has the entire tail black, but in the other two it is grizzled distally: there is never a pale streak on the underside.

This monkey is subject to a considerable amount of "bleaching" in life and the original description seems to have been drawn up from a specimen in worn pelage. Skins in good condition are brownish black on the back (between seal-brown and black of Ridgway): the lower parts of the limbs and the hands and feet are always considerably darker, and often quite glossy black.

The colour pattern on the thighs is that peculiar to all forms of the species. I doubt if any monkey of this group is other than white on the under parts when newly collected. Old and fatty skins usually turn buff in colour, and some preservatives also seem to have this effect. In the flesh, *P. s. natunae* is quite white on the pale under parts (cf. Miller, Journ. Mamm. 1934, p. 133).

The slight difference between the arrangement of the hair on the head of *natunae* and that of other races of *siamensis* does not seem of great importance. Whether or not the frontal hairs appear to radiate from one or two centres is largely a matter concerning the point of origin of the crest.

In *siamensis* the long, occipital tuft, or pad is usually preceded by a narrow, compressed, and median crest running down almost to the brow. This crest is formed by vertically growing hairs on the middle line of the forehead, and from its base, on each side, the frontal hairs diverge.

In *natunae* the forehead is rather more bushy than in *siamensis* and an anterior prolongation of the crest is rarely well marked; when it is, and there is a median line of lengthened hairs, the frontal whorl is divided and an appearance of two radiating centres of hair is simulated.

"Face, grey; ears, muzzle and area round the eyes, fleshy. Palms and callosities, black." In one female the ears were grey.

This monkey is restricted in range to Bunguran, or Great Natuna Island where it lives in the heavy forest. The types came from Mt. Ranai in the east of the island and the present examples from the lowland forest on the west coast.

(For measurements *see* page 30).

Nycticebus coucang natunæ Stone and Rehn.

Nycticebus tardigradus, Thos. and Hart., Nov. Zool., I, 1894, p. 655 (Bunguran); op. cit., II, 1895, p. 489 (Bunguran); Miller, Proc. Wash. Acad. Sci., III, 1901, p. 138 (Bunguran).
Nycticebus coucang natunae Stone and Rehn, Proc. Acad. Nat. Sci. Phil., 1902, p. 140 (Bunguran).
Nycticebus natunae, Lyon, Proc. U. S. Nat. Mus., XXXI, 1906, p. 534 (Bunguran).

Bunguran, 1 ♀.

This specimen is very richly coloured and like some from Sarawak except that the under parts are largely tawny. In the skull there are four upper incisors, the two outer of which are very small and slender. The temporal ridges are well apart and the mastoid and audital bullæ are more inflated than in examples of *N. c. borneanus*.

External measurements (in the flesh.)—Head and body, 274; tail, 16; hind-foot (s.u.), 62; ear, 20 mm.

Skull: greatest length, 56.9; basal length, 47.9; greatest width, 40.2; front of canine to back of last molar (alveoli), 20; least width between temporal ridges, 5 mm.

Note.—Mr. H. J. Baker has recently presented to the Raffles Museum a skin and two skulls of *Nycticebus* obtained on the island of Batam. These seem to be the first specimens recorded from the Rhio Archipelago and, although no actual topotypes of *N. c. bancanus* Lyon, described from Banka Island, are available for examination, the Batam animals are referred to that form as on description they are not separable, except that they have four upper incisors.

Excluding the northern race, *N. c. cinereus*, the Raffles Museum collection includes twenty-six skins of *Nycticebus*. They are easy to divide into three groups based on colour distinctions:—

The first-group consists of animals from the Malay States, south to Singapore Island, and Sumatra. All are relatively dull in colour.

The second group, including skins from Borneo, and one from the Natuna Islands, is much more richly coloured. The Natuna skin stands out by reason of its tawny under parts, but otherwise it is exactly like a skin from Sarawak.

The third group includes animals from the Rhio Archipelago. They are bright, like the Natuna skin, but have the vertebral stripe paler and brighter. The skulls of the specimens in this third group, which for the present I place under *bancanus*, in spite of the invariable four upper incisors, have the temporal ridges well separated.

The Batam animal (a male) measured in the flesh.—Head and body, 280; tail, 10; hind-foot, 58; ear, 19 mm. Two skulls from Batam measure.—Greatest length, 56.5, 58.3; basal length,

49, 49.6; greatest width, 39.6, 42.2; front of canine to back of last upper molar (alveoli), 20.2, 20.5; least distance between temporal ridges, 7.2, 5.3 mm.

Tarsius bancanus Horsf.

Sirhassen, 1 ♂.

This is the most interesting specimen in the collection providing as it does an entirely new locality for *Tarsius*.

That it represents an undescribed race is more than likely but the comparative material available is very poor and in view of the existence of Elliot's names and the uncertainty of the nomenclature (see Robinson and Kloss, Journ. Fed. Mal. States Mus., VII, 1919, p. 259) I cannot, at the moment, attempt a more precise determination.

Although agreeing in the distribution of hair on hands, feet and tail, in colour the Natuna skin is greyer and much less buffy in tone than two unsexed specimens from Sarawak, and it is more like an old mounted specimen from "British North Borneo".

The external measurements taken in the flesh by a native collector are certainly not accurate.

Skull: Greatest length, 36.7; occipito-nasal length, 34.8; front of *pmx.* to front of foramen-magnum, 26.5; front of *pmx.* to posterior extremity of palate, 15.4; least breadth between m^3–m^3 internally, 8.8; greatest length of bullæ diagonally, 11.7; greatest width of skull, 32; greatest breadth of braincase, 22; greatest length of upper molar row, 12.2 mm.

Arctogalidia trivirgata inornata Miller.

Arctogalidia inornata Miller, Proc. Wash. Acad. Sci., III, 1901, p. 131 (Bunguran Island, North Natunas).

Bunguran, 1 ♀; 1 ♂ (skin only, V. Knight coll., 1912); 1 ♂ (skull only, V. K., coll., 1909).

Both skins differ from a number of the Malayan *A. t. major* and the Bornean *A. t. stigmatica* in that the top of the head is not blackened. In the female the mid-dorsal stripe is faintly indicated as in some *stigmatica*, but three stripes are readily discernible in the male, in about the same degree as in less heavily marked examples of *major*, which, however, is normally much more heavily marked.

A. t. inornata is a small race.

External measurements (in the flesh) of a female.—Head and body, 450; tail, 455; hind-foot (s.u.), 70; ear, 35 mm.

Skulls of a male (given first) and a female measure.—Greatest length, 103.5, 92.6; condylo-basal length, 100.4, 90.2; median palatal length, 55.8, 48.7; zygomatic breadth, 61.7, 50.5; upper teeth, canine to last molar (alveoli), 35, 31.5 mm.

Mydaus javanensis ollula Thos.

Mydaus meliceps, Thos. and Hart., Nov. Zool., I, 1894, p. 657 (Bunguran); op. cit., II, 1895, p. 490 (Bunguran).
Mydaus ollula Thos., Ann. Mag. Nat. Hist. (7), IX, 1902, p. 443 (Bunguran).

Bunguran, 1 ♀.

Compared with two specimens of the Bornean race, *M. j. lucifer*, this example from Bunguran has a smoother coat and is more thinly haired. The white vertebral stripe is very thin and broken for a short space on the withers and on the base of the tail. The tip of the tail is white. There is only the slightest indication of a whorl on the nape, and on the surface of the pelage in that region no forwardly directed hairs can be detected. Both Thomas and Kloss[1] have pointed out the doubtful diagnostic value of the whorl and the colour pattern in this species.

The skull of the present specimen is smooth and rounded rather than "conspicuously ridged and angular", and although it may not be aged it is not immature. Similar skulls have been noted among Bornean examples by Lönnberg and Mjöberg[2]. As the tail is comparatively short there seems little to distinguish the Natuna race except the greater tendency to whiteness on the face and under surface. In the present specimen there are whitish hairs on the cheeks, a pale patch on each side of the neck, and a broad, but ill-defined pale area on the breast.

Maximum figures for the greatest length of the skull in Malaysian races of *Mydaus* seem to be.—

Males: *javanensis*, 97; *lucifer*, 105; *ollula*, 90.3 mm.

Females: *javanensis*, 82; *lucifer*, 89; *ollula*, 82.6 mm.

The Bornean race is therefore the largest and the Natuna race may prove to be rather smaller than *javanensis*.

External measurements in the flesh.—Head and body, 385; tail, 25; hind-foot (s.u.), 60; ear, 22 mm.

Skull.—Greatest length, 82.6; basal length, 72.7; zygomatic breadth, 38.6; mastoid breadth, 39.5 mm.

Tragulus javanicus bunguranensis Miller.

Tragulus napu, A. Everett in Thos. and Hart., Nov. Zool., I, 1894, p. 660 (reported from Bunguran).
Tragulus bunguranensis Miller, Proc. Wash. Acad. Sci., III, 1901, p. 113 (Bunguran Island, North Natuna Islands).

Bunguran, 1 ♂, 1 ♀.

This large, black-necked race has been discussed in detail by Miller: it is a very distinct form.

(For measurements *see* page 31).

1. Thomas, Ann. Mag. Nat. Hist. (9), XX, 1927, p. 288; Kloss, Journ. Mal. Br. Roy. Asiat. Soc., V, 1927, p. 348.
2. Ann. Mag. Nat. Hist. (9), XVI, 1925, p. 510.

Tragulus javanicus abjectus subsp. nov.

Tragulus sp., Miller, Proc. Wash. Acad. Sci., III, 1901, p. 115 (Sirhassen; two immature specimens).

Type.—Adult male (skin and skull), collected on Sirhassen Island, South Natuna Islands, on 29th August, 1931 by P. M. de Fontaine. Raffles Museum No. 2886.

Diagnosis.—Very near to *T. j. napu* of the Malay States and *borneanus* of British North Borneo, but smaller. In colour not separable from the paler, more buffy coloured examples of Malayan *napu:* also extremely close to the less blackened specimens of *borneanus*, but the nape stripe rather more obvious although still by no means well-defined.

Specimens examined.—The type and one immature male from Sirhassen Island.

Measurements.—*See* page 31.

Remarks.—Measured with the hoof, the hind feet of adult males of *T. j. napu* from the Malay Peninsula give a range of 146–154 mm. Animals of the same sex with the feet measuring 142–145 mm. are, judging by the teeth, immature. The above are collectors' measurements taken in the flesh: measured dry in the skin the feet of adult males give a range of 139–150 mm.

Adult females, according to the various collectors, have the feet measuring 150–152 mm.: dry measurements reduce this range to 148–150 mm.

In adults of *borneanus* the feet of males measure 142–150 (dry, 135–145 mm.); in females, 145–153 mm. (dry, 142–151 mm.).

The hind-foot of the adult male type of *abjectus* measures, dry 126 mm. The native collector who skinned the animals records 130 mm. for the same measurement in the flesh and this seems reasonable.

Malayan *T. j. napu* gives the following ranges for the condylo-basal length of the skull; adult males, 109–110 mm.; adult females, 106–112 mm.; an immature male, 100 mm.

The same measurements in *borneanus* are 105–109 mm. for males, and 106.5–108 mm. for females.

The male type of *abjectus* has the condylo-basal length of the skull, 101.2 mm. The type is adult although the molars are not much worn.

Tragulus kanchil everetti Bonhote.

Tragulus javanicus, Thos. and Hart., Nov. Zool., I, 1894, p. 660 (specimens from Bunguran only); Thos. and Hart., op. cit., II, 1895, p. 492 (specimens from Bunguran only); Miller, Proc. Wash. Acad. Sci., III, 1901, p. 115 (Bunguran).
Tragulus kanchil everetti Bonhote, Ann. Mag. Nat. Hist. (7), 11, March 1903, p. 295 (Bunguran Island, North Natuna Islands).
Tragulus natunae Miller, Proc. Biol. Soc. Wash., XVI, 19th March, 1903, p. 38 (Bunguran Island, North Natuna Islands).

Bunguran, 4 ♂, 4 ♀.

This is a very bright race, more richly coloured, especially on the flanks, than the several races inhabiting the Malay Peninsula, Sumatra and Borneo; its nearest relative appears to be *rubeus* Miller, of Bintang Island in the Rhio Archipelago, for this latter race can only be separated on the average colour characters of a less blackened back and rather darker throat stripes. Lack of material prevents discussion here of comparative characters in the skull attributed to *everetti* by Bonhote and Miller in comparison with the Sarawak *hosei*.

(For measurements *see* page 31).

Tragulus kanchil abruptus subsp. nov.

? *Tragulus javanicus*, Thos. and Hart., Nov. Zool., I, 1894, p. 660 (Sirhassen "seen").

Type.—Adult male (skin and skull), collected on Subi Island, South Natuna Islands on the 4th August 1931, by P. M. de Fontaine. Raffles Museum No. 3799.

Characters.—A race belonging to the "cold" coloured section of *T. kanchil* and very different from the richly coloured *everetti* of Bunguran, *rubeus* of the Rhio Archipelago, and the races found in the Anamba Islands. In colour nearest to *klossi* of British North Borneo, but the nape stripe ill-defined and much less conspicuous, the thighs more rufous, the dark longitudinal throat stripes darker, and the white outer throat stripe broken by a well-defined band of colour which seems never to be present in *klossi*. *T. k. pallidus* Miller, of Pulau Laut, North Natunas, is paler and has the nape stripe well defined.

Colour.—Above, yellowish buff mixed with black, the black producing a clouded effect rather than the fine grizzle seen in most races of *T. kanchil:* the warm element entirely lacking on the flanks, which are greyish. Crown of the head, almost black, the nape stripe, grizzled and not conspicuous. Fore limbs, yellowish buff and a patch of tawny, or orange-tawny on the thighs. Dark throat stripes, mixed yellowish buff and black, the black predominating, but the transverse band mostly yellowish buff. Under parts, largely white, but there is a variously coloured central streak, and a thin buff line bordering the grey flanks.

Skull and teeth.—Although some races of *Tragulus kanchil* have been stated to possess distinctive subspecific characters the skulls of this isolated new form seem to present no peculiar features other than those of purely individual value.

Measurements.—*See* page 31.

Specimens examined.—Two (including the type), from Pulau Subi, South Natunas.

Remarks.—Whereas the smaller mouse-deer of Bunguran Island in the North Natuna Islands is very like a form occurring in the Rhio Archipelago, that inhabiting the South Natuna Islands is nearest to a Bornean race.

Sus cristatus natunensis Miller.

Sus sp., Thos. and Hart., Nov. Zool., I, 1894, p. 660 (Bunguran); op. cit., II, 1895, p. 492 (Bunguran).

Sus natunensis Miller, Proc. Wash. Acad. Sci., III, 1901, p. 117 (Pulau Laut, North Natuna Islands; also from Lingung Island); Proc. U. S. Nat. Mus., XXX, 1906, p. 753.

Bunguran, 2 ♀.

Both adult with dentition complete. External measurements taken in the flesh.—Total length, 1258, 1221; tail, 166, 204; hind-foot with hoof, 223, 230; ear, 90, 102 mm.

Skulls.—Upper length, 282.5, —; basal length, 251, 260; zygomatic breadth, 128.5, 132; maxillary toothrow to front of canine, 112, 119 mm.

Petaurista petaurista nitidula (Thos.).

Pteromys nitidus, Thos. and Hart., Nov. Zool., I, 1894, p. 660 (Bunguran); op. cit., II, 1895, p. 490 (Bunguran).

Petaurista nitidula Thos., Nov. Zool., VII, 1900, p. 592 (Bunguran); Miller, Proc. Wash. Acad. Sci., III, 1901, p. 121 (Bunguran).

No flying-squirrel is included in the present collection, but there is, in the Museum, a skin collected on Bunguran, in August 1894 by E. Hose. In colour this is duller and darker than any example of *P. p. melanotus* from the Malay Peninsula, or *P. p. rajah* of Borneo, in general tone standing between these two comparatively bright forms, and the dark *P. p. petaurista* of West Java, although nearest to *melanotus* on account of the pale face. The hands and feet are brown and scarcely darker than the remainder of the limbs.

The skull is small and measures.—Greatest length, 62.5; condylo-basilar length, 57; zygomatic breadth, 43.9; least interorbital breadth, 14.7; upper molar row (alveoli), 14.2; median nasal length, 17.5; greatest breadth of combined nasals, 12 mm. The nasals constrict in the centre more abruptly than in any skull in fair series of *P. p. petaurista*, or *P. p. melanotus*.

Note.—Two examples of this species obtained on Bintang Island, Rhio Archipelago, in June 1930, by some native collectors of the Raffles Museum, are the first specimens recorded from the Rhio Archipelago although the species was reported to occur on Batam Island.

The specimens, both males, are darker and duller than *P. p. melanotus* from the Malay Peninsula which form occurs on Singapore Island within sight of Bintang. They are larger than *P. p. nitidula* of Bunguran, and furthermore differ in the

possession of black hands and feet which contrast with the bright chestnut limbs. In one specimen the black areas are relatively small: the black tail tip is much reduced, and on the under side of the wrists and ankles, the black shows only as a narrow band. In this example the centre of the metacarpus is chestnut. In the other skin the black tail tip is larger, and the under sides of the limbs are mostly black.

On description the Bintang form cannot be separated from *P. p. batuana* Miller[1] (syn. *marchio* Thos.) which occurs on the mainland of Sumatra. *P. p. mimicus* Miller, of Pulau Rupat, East Sumatra, is a smaller subspecies.

The skulls measure.—Greatest length, 67.7, 68.6; condylo-basilar length, 60.7, 60.3; zygomatic breadth, 46.2, 45.9; upper molar row (alveoli), 15.8, 15.9; median nasal length, 18.8, 20.4; greatest breadth of combined nasals, 12.2, 13; least interorbital breadth, 14.7, 14.3 mm.

Ratufa affinis bunguranensis (Thos. and Hart.).

Sciurus bicolor bunguranensis Thos. and Hart., Nov. Zool., I, 1894, p. 658 (Bunguran); op. cit., II, 1895, p. 491 (Bunguran).
Ratufa bunguranensis, Miller, Proc. Wash. Acad. Sci., III, 1901, p. 129 (Bunguran).

Bunguran, 4 ♂, 2 ♀.

The close relationship between this black-footed form and *R. a. personata* from the northern part of the Malay Peninsula has already been dealt with by Miller.

(For measurements *see* page 32).

Ratufa affinis sirhassenensis (Bonh.).

Sciurus bicolor albiceps, Thos. and Hart., Nov. Zool., I, 1894, p. 659 (Sirhassen).
Ratufa ephippium sirhassenensis Bonh., Ann. Mag. Nat. Hist. (7), 5, 1900, p. 498 (Sirhassen).

Sirhassen, 4 ♂, 2 ♀.

It is difficult to see why Bonhote allied this subspecies with the North Natuna races from which it is very distinct. It is, as Miller remarks, much nearer to the Bornean races. No *R. a. ephippium* are available for comparison, but otherwise, in colour, the Sirhassen skins are most like pale examples of *baramensis* although still markedly paler.

(For measurements *see* page 32).

Sciurus prevosti navigator (Bonh.).

Sciurus prevosti, Thos. and Hart., Nov. Zool., I, 1894, p. 659 (Sirhassen).
Sciurus prevostii navigator Bonh., Ann. Mag. Nat. Hist. (7), 7, 1901, p. 171 (Sirhassen).
Sciurus navigator, Miller, Proc. Wash. Acad. Sci., III, 1901, p. 129 (Sirhassen and Subi).

1. *Petaurista batuana* Miller, Smiths. Misc. Coll., xlv, 1913, p. 27 (Batu Islands, West Sumatra).

Sirhassen, 2 ♂, 1 ♀; Panjang, 4 ♂, 3 ♀; Subi, 5 ♂, 5 ♀.

In colour these skins are very near to red-footed individuals of *P. p. borneoensis*, but they are smaller and less deeply red below, and the tail is never so heavily grizzled. All the squirrels of this species from the various islands of the South Natuna group appear to belong to one race. The colour is rather variable. The tail is usually black, but in a few cases it is conspicuously grizzled with white. Most of the skins from Panjang are redder on the cheeks, thighs and feet than the three topotypes from Sirhassen, but both varieties occur on Subi and as the series examined from the other islands are not large, no further separation of subspecies seems advisable.

(For measurements *see* page 33).

Sciurus notatus rubidiventris Miller.

Sciurus notatus, Thos. and Hart., Nov. Zool., I, 1894, p. 659 (Bunguran specimens only); op. cit., II, 1895, p. 491 (Bunguran specimens only).
Sciurus rubidiventris Miller, Proc. Wash. Acad. Sci., III, 1901, p. 127 (Bunguran Island, North Natuna Islands).

Bunguran, 11 ♂, 3 ♀.

S. n. rubidiventris is a very richly coloured form with dull feet and an especially broad, dark lateral stripe: it needs no comparison with the other races known from the North and South Natunas and the Anamba Islands, all of which are paler on the underparts. Judging by colour alone, the nearest relatives of *rubidiventris* are certain forms found in the south of the Malay Peninsula and in the Tioman and Rhio Archipelagos. Of these, *stellaris* of Bintang Island is certainly the nearest for even with good fresh series of both subspecies it is difficult to make any separation. *S. n. rubidiventris*, however, seems to be very constant in colour, and variation in tone on the under parts is almost negligible. Although some *stellaris* are absolutely inseparable from *rubidiventris* on colour, the Bintang race is more variable and some individuals are yellower, and others much redder below, than topotypes of *rubidiventris*.

(For measurements *see* page 34).

Sciurus notatus rutiliventris Miller.

Sciurus rutiliventris Miller, Proc. Wash. Acad. Sci., III, 1901, p. 126 (Pulau Midai, or Low Island, Natuna Islands).

Sedanau, 1 ♂, 7 ♀.

A small form with the under parts bright, clear orange-rufous: smaller and decidedly paler than *rubidiventris* of Bunguran, and slightly larger and much more deeply coloured below than *lutescens* of Sirhassen. Compared with *lautensis* (specimens examined) the tail is darker with more conspicuous

annulations, the under parts redder and less tawny, the black lateral stripe more distinct and not grizzled with orange-buff.

No exact topotypes of *rutiliventris* are available for comparison but as the description fits very closely, no further separation is attempted.

(For measurements *see* page 35).

Sciurus notatus lutescens Miller.

Sciurus notatus, Thos. and Hart., Nov. Zool., I, 1894, p. 659 (specimens from Sirhassen only).
Sciurus lutescens Miller, Proc. Wash. Acad. Sci., III, 1901, p. 124 (Sirhassen Island, South Natuna Islands).

Sirhassen, 8 ♂, 7 ♀; Berian, 1 ♂, 2 ♀.

The Sirhassen race of *Sciurus notatus* is remarkably small and, typically, extremely pale on the under parts. It seems not to demand any close comparison with any other race of *notatus*, but its nearest ally seems to be the Bornean subspecies, *dilutus*.

The range of variation in the fifteen skins is considerable although the original series is said by Miller to show no variation worthy of note.

The palest example is entirely without trace of ochraceous on the under parts which are, roughly, whitish tinged with pale buff on the middle line and on the inside of the thighs. In another phase the under parts are creamy buff. Other skins are tinged with ochraceous and the most deeply coloured animals are, in colour, exactly like some *dilutus* from North and East Borneo.

The three skins from Berian are all very bright below and two are separable from even the most brightly coloured Sirhassen skins by a slight reddish tinge on the under parts.

Berian, however, is so close to Sirhassen that without longer series it cannot be accepted that the two islands are inhabited by distinct subspecies even of this exceptionally plastic squirrel.

(For measurements *see* page 34).

Sciurus tenuis procerus Miller.

Sciurus tenuis, Thos. and Hart., Nov. Zool., I, 1894, p. 659 (Bunguran); op. cit., II, 1895, p. 492 (Bunguran).
Sciurus procerus Miller, Proc. Wash. Acad. Sci., III, 1901, p. 122 (Bunguran Island, North Natuna Islands).

Bunguran, 7 ♂, 3 ♀.

The only character by which these specimens seem separable from typical *S. t. tenuis* of Singapore Island is that of the slightly smaller average size of the skull: in colour and body measurements the two forms seem exactly alike. The skulls of *procerus* listed above have the greatest length 35.5–36.4 mm., against 36–37.4 mm. in ten exact topotypes of *tenuis: tenuis* in

the south of the Malay Peninsula runs up to 38.2 mm. in the greatest length of the skull although such large animals are exceptional. In *S. t. parvus* of Borneo the skull attains a length of 41 mm.

(For measurements *see* page 35).

Sciurus lowi natunensis Thos.

Sciurus lowi, Thos. and Hart., Nov. Zool., I, 1894, p. 659 (Sirhassen).
Sciurus lowi natunensis Thos., Nov. Zool., II, 1895, p. 26 (Sirhassen Island, South Natuna Islands); Thos. and Hart., tom. cit., p. 491, (Bunguran and Pulau Laut).
Sciurus natunensis, Miller, Proc. Wash. Acad. Sci., III, 1901, p. 123 (Sirhassen).
Sciurus lingungensis Miller, Proc. Wash. Acad. Sci., III, 1901, p. 123 (Lingung Island off southern extremity of Bunguran, North Natuna Islands).

Bunguran, 2 ♂, 3 ♀; Sirhassen, 2 ♂, 2 ♀.

The only appreciable difference between these specimens and a good series of typical *lowi* of Borneo is that the former have rather shorter skulls. It so happens that the Sirhassen animals are white below whereas those from Bunguran are washed with creamy buff, especially on the throat, but both phases occur in Borneo, and Miller states that his examples from Sirhassen and Lingung are alike in colour.

In a large series of typical *lowi* the audital bullæ are very variable in shape, and both conditions of the anterior lobes mentioned by Miller are found in skulls from Borneo, and from Bunguran: it seems therefore that *lingungensis* should be added to the synonymy of *natunensis*.

(For measurements *see* page 36).

Rhinosciurus laticaudatus subsp.

Rhinosciurus sp., Miller, Proc. Wash. Acad. Sci., III, 1901, p. 131 (Sirhassen).

Bunguran, 1 ♂ juv.

This specimen is too young for a more accurate determination. There is no previous record of the genus from the North Natuna Islands.

Rattus sabanus bunguranensis subsp. nov.

Mus sabanus, Thos. in Thos. and Hart., Nov. Zool., I, 1894, p. 658 (Bunguran); Miller, Proc. Wash. Acad. Sci., III, 1901, p. 121 (Bunguran).

Bunguran, 1 ♂, 2 ♀.

Type.—Adult female (skin and skull), collected on Bunguran Island, North Natuna Islands on 8th September 1928, by F. N. Chasen. Raffles Museum No. 665.

Colour characters.—A pale, dull form nearest to *R. s. ululans* of Sumatra (specimens from Bencoolen and Palembang), but

rather brighter, especially on the flanks thereby approaching the Malayan *vociferans:* much less yellow than typical *sabanus* and *vociferans* and needing no close comparison with the much blackened *strepitans* of the Anamba Islands, *stridens* of Tioman Island and, judging by description, with *fremens* of Sinkep and Lingga.

Skull.—The skull is in an interesting intermediate condition. It has the wide maxillary plate of *vociferans*, but the antorbital foramen is less contracted: at the same time this foramen is constricted below and less open than in typical *sabanus* of Borneo.

External measurements.—Head and body, 239; tail, 381; hind-foot, 45; ear, 27 mm.

Skull.—Greatest length, 56.2; condylo-basilar length, 48.1; diastema, 15.4; upper molar row (alveoli), 9.8; median nasal length, 22.3; interorbital breadth, 9.4 mm.; zygomatic breadth, 26.5; length of palatal foramina, 7.3 mm.

Specimens examined.—Four, including the type, and one collected on Bunguran in June 1912 by Mr. V. Knight.

Remarks.—Two specimens have the tail fairly evenly bicolored but in two others the distal portion is entirely white.

(For measurements *see* page 37).

Rattus rajah hidongis Kloss.

? *Rattus rajah*, Miller, Proc. Wash. Acad. Sci., III, 1901, p. 121 (Specimens from South Natunas only).
Rattus rajah hidongis Kloss, Treubia, II, 1924, p. 122 (Sirhassen Island, South Natuna Islands).

Sirhassen, 1 ♂, 11 ♀.

In colour this rat is very like *R. r. rajah* Thos., of Borneo and *R. r. pellax* Miller, of the Malay Peninsula, but it has a shorter tail. It is immediately separable from the neighbouring *R. surifer* races, *lingensis* and *bandahara* by its duller, less yellow colour. Although the base of the under fur, and of the spines, is largely grey in the fresh pelage, Kloss appears to have been right in linking *hidongis* to *R. rajah* and not to *R. surifer* for in all the *hidongis* skulls there is a marked extension of the nasals beyond the fronto-premaxillary sutures. All the skins have the white of the under parts continuous with the pale feet, and no specimen shows a coloured gorget.

Without examination of the specimens it is impossible definitely to allocate to species "*Mus hellwaldi*" and "*Mus rajah*" listed by previous authors from various islands in the Natuna group. Two species now known as *R. rajah* and *R. surifer* are likely to occur together on any one of the islands.

(For measurements *see* page 38).

Rattus surifer lingensis (Miller).

? *Mus hellwaldi*, Thos. in Thos. and Hart., Nov. Zool., I, 1894, p. 658 (Bunguran).
? *Mus rajah*, Thos., Nov. Zool., II, 1895, p. 26 (Bunguran); Miller, Proc. Wash. Acad. Sci., iii, 1901, p. 111 (Specimens from North Natunas only).
Mus lingensis Miller, Proc. Wash. Acad. Sci., II, 1900, p. 206 ("Linga Island").

Bunguran, 11 ♂, 16 ♀.

In colour these rats are like *lingensis* as represented by examples from various islands of the Rhio Archipelago, but the tail is longer. The tails of adults from Bunguran give a range of 164 (1); 176–202 mm. with an average of 185 mm. This figure is only exceeded by five specimens in very long series from the Rhio Archipelago. But "*lingensis*" of East Sumatra also has a comparatively long tail, 171–205 mm. *fide* Lyon, with a high average of 192 mm. The tail length of the type of *lingensis* is given as 171 mm., and until measurements of a series of topotypes are available no further subspecific separation can be made. The Anamba subspecies has a very *short* tail.

The Bunguran skins have the spines and under fur grey. Only one specimen shows a trace of a coloured gorget. The white of the hind-foot is narrowly continuous with that of the inside of the thigh. The tail is bicolored and usually, but not invariably, also white distally.

(For measurements *see* page 38).

Rattus whiteheadi batamanus (Lyon.).

Mus batamanus Lyon, Proc. U. S. Nat. Mus., XXXI, 1907, p. 654 (Batam Island, Rhio Archipelago).

Sirhassen, 7 ♂, 2 ♀.

These examples from Sirhassen are very dull in colour, the backs comparatively dark, the under parts mostly grey, and never strongly ochraceous.

Of eighty-three skulls of typical *R. whiteheadi* from Borneo only four attain a length of 35 mm. and over. These four measure in their greatest length, 35, 35.1, 35.5 and 36.3 mm.

The five largest of eighty-eight Malayan skulls measure 35.1, 35.2, 35.3, 35.6 and 36 mm.

No skull of twenty Sumatran (excluding the east coast) specimens attains a length of 35 mm.

The South Natuna series, of which six perfect skulls measure 34.6, 35.1, 36, 36.2, 36.5 and 36.6 mm., therefore averages large and is accordingly placed under *batamanus* the type of which is said to measure 36.3 mm. in its greatest length of skull.

(For measurements *see* page 39).

Rattus rattus pauper (Miller).

Mus neglectus, Miller, Proc. Wash. Acad. Sci., III, 1901, p. 121 (Sirhassen specimens).
Epimys rattus pauper Miller, Smiths. Misc. Coll., LXI, No. 21, p. 13 (Sirhassen Island, South Natuna Islands).

Sirhassen, 3 ♂, 4 ♀; Panjang, 1 ♂, 2 ♀; Subi, 2 ♂.

Compared with the field-rat of Sarawak, South-west Borneo and Bandjermasin and with that of Sumatra and the Malay Peninsula this is a duller rat with the ochraceous element in the upper parts much reduced. Some adult Bornean skulls have the greatest length 40.5, 41, 42.7, 43.5, 44.7 mm.: *pauper* with a range of 39.6–42.3 mm. is therefore rather smaller. *Pauper* has also very small bullae. *R. r. mangalumis* Kloss[1] from Mangalum Island is very near to *pauper*. Like that form it is dull in colour, comparatively small, and has small bullæ but it can be separated on its longer, narrower, more slit-like palatal foramina.

The skins from Panjang and Subi are rather darker than exact topotypes of *pauper* from Sirhassen and indeed are not separable from pale examples of the next race to be described but as they have the skulls of *pauper* they are placed under that name.

(For measurements *see* page 37).

Rattus rattus luxuriosus subsp. nov.

Mus rattus var., Thos. in Thos. and Hart., Nov. Zool., I, 1894, p. 658 (Bunguran).
Mus neglectus, Thos. and Hart., Nov. Zool., II, 1895, p. 492 (Bunguran); Miller, Proc. Wash. Acad. Sci., III, 1901, p. 121 (? Lingung and Midai specimens).

Diagnosis.—A dull coloured, white-bellied field-rat with the upper parts much darker than in *R. r. pauper* of Sirhassen Island, and exactly as in many examples, but not the darkest, of *R. r. rhionis* of Bintang Island, Rhio Archipelago. Larger than *pauper* (greatest length of skull, 42–44.1 mm., against 39.5–42.3 mm.) and with much larger bullae.

Type.—Adult male (skin and skull), collected on Bunguran Island, North Natuna Islands, on 3rd September, 1928 by F. N. Chasen. Raffles Museum No. 638.

Specimens examined.—Bunguran, 4 ♂, 3 ♀; islet of Pasir, off west coast of Bunguran, 2 ♂, 9 ♀; Sedanau, 6 ♂, 4 ♀.

External measurements.—Head and body, 176; tail, 166; hind-foot, 33; ear, 20 mm.

Skull.—Greatest length, 42.8; condylo-basilar length, 37.7; diastema, 12.2; upper molar row (alveoli), 6.7; median nasal length, 15.3; interorbital breadth, 6.7; zygomatic breadth, 20.9; length of palatal foramina, 7.8 mm.

1. *Rattus rattus mangalumis*, Bull. Raffles Mus., 5, 1931, p. 88 (Mangalum Island, N. W. Borneo).

Remarks.—In its major characters of colour, size and condition of bullæ this rat is an interesting intermediate form between the field-rat of the South Natuna Islands (*R. r. pauper*) and that of the eastern islands of the Rhio Archipelago (*R. r. rhionis*).

(For measurements *see* page 37).

Rattus rattus diardi (Jent.).

Sedanau, 2 ♂, 1 ♀; Sirhassen, 8 ♂, 4 ♀; Panjang, 2 ♂, 2 ♀; Subi, 1 ♂, 2 ♀.

The Malaysian house-rat, as variable in colour in the Natuna Islands as elsewhere, seems to be widely spread in the group. The largest skull is that of an adult male: it measures 44.7 mm. in its greatest length.

Rattus rattus ephippium (Jent.).

Mus ephippium, Thos. and Hart., Nov. Zool., II, 1895, p. 492 (Bunguran).

Bunguran, 2 ♂, 1 ♀; Panjang, 12 ♂, 7 ♀; Sirhassen, 1 ♀.

These rats have been identified purely on the balance of characters: some are like "*concolor*" from the Malay Peninsula, but most have the palate rather broader. The largest skulls have been selected for inclusion in the table of measurements on page 38.

Rattus mülleri integer (Miller).

Mus integer Miller, Proc. Wash. Acad. Sci., III, 1901, p. 119 (Sirhassen Island, South Natunas).

Sirhassen, 2 ♂, 1 ♀.

The measurements of the female are not included in the table on p. 39, for it is a very small animal (greatest length of skull 49.3 mm.) and possibly not full grown, although the teeth are slightly worn.

R. m. borneanus Miller, is very near to this form but large series of it from Sarawak and British North Borneo show that it is a distinct race. *Borneanus* is a brighter rat, noticeably so in series on account of the very bright individuals it occasionally throws up: few *borneanus* are as dull as *integer* and none is so finely grizzled. The tail is longer, but on account of the great variation shewn by the skulls the only constant character of separation from *integer* seems to be that of the larger bullæ.

(For measurements *see* page 39).

Rattus mülleri firmus (Miller).

? *Mus integer*, Proc. Wash. Acad. Sci., III, 1901, p. 120 (specimen from Lingung).
Mus firmus Miller, Proc. Acad. Nat. Sci. Phil., 1902, p. 155 ("Linga Island").

Bunguran, 1 ♂.

The tail is longer than in *R. m. integer* of Sirhassen and the teeth and bullæ are noticeably larger. I cannot separate this single specimen from numerous examples of *firmus* from various islands of the Rhio-Lingga Archipelago, all of which, like the Bunguran specimen, are rather paler and yellower than the topotypes of *integer*.

(For measurements *see* page 39).

Tupaia glis natunæ Lyon.

Tupaia splendidula, Thos. and Hart., Nov. Zool., I, 1894, p. 656 (Bunguran); Miller, Proc. Wash. Acad. Sci., III, 1901, p. 133 (Bunguran).
Tupaia splendidula typica, Thos. and Hart., Nov. Zool., II, 1895, p. 489 (Bunguran).
Tupaia natunae Lyon, Proc. Biol. Soc. Wash., XXIV, 1911, p. 168 (Bunguran).

Bunguran, 1 ♂, 3 ♀.

This race is much more like the bright *T. g. castaneus* of Bintang Island than the duller forms from the nearer Anamba Islands, but it is readily separable from *castaneus* by its less deeply coloured under parts and shoulder stripe.

Authors have either definitely referred this race to *T. splendidula*, or have compared it with that form, which it closely resembles. Lyon treats *splendidula* as a full species inhabiting South Borneo, where, as specimens collected by Dr. W. L. Abbott seem to show, it occurs, in a few localities, together with *T. salatana*, which I regard as a subspecies of the widely spread *T. glis*. I have not seen *splendidula*, and my action in linking *natunae* to *glis* may, therefore, be wrong, but it now seems certain that *splendidula* does not occur in the zoologically well explored northern parts of Borneo, and I hesitate to link the Natuna race to the more geographically remote of the two Bornean species. Furthermore, the status of *splendidula* as a full species seems to require further investigation for in South Borneo it would appear that it and *salatana* are largely mutually exclusive.

(For measurements *see* page 40).

Tupaia tana sirhassenensis Miller.

Tupaia tana, Thos. and Hart., Nov. Zool., I, 1894, p. 657 (Sirhassen).
Tupaia sirhassenensis Miller, Proc. Wash. Acad. Sci., III, 1901, p. 133 (Sirhassen).

Sirhassen, 4 ♂, 7 ♀.

The affinities of this race are with the races occurring in North and North-west Borneo. It is much less bright than *T. t. nitida* of West Sarawak and in general tone it is very near to *T. t. utara* from Mt. Dulit in North Sarawak and *paitana* from the territory of British North Borneo. *T. t. sirhassenensis*,

however, has the tail redder and less blackened than in *utara* and *paitana*. The grizzled pale area on the fore-back is more reduced than in *paitana*, but exactly as in *utara* which form *sirhassenensis* therefore most nearly resembles on the balance of colour characters. The cranial peculiarities of this form which have been described in detail by Miller are well marked in the skulls of the present series. While the measurements given below show that the Sirhassen form is indeed slightly smaller than *paitana* and *utara* they also show that the original series of specimens did not represent the maximum size of the subspecies.

(For measurements *see* page 40).

Crocidura aagaardi Kloss.

? *Crocidura* sp., Thos. and Hart., Nov. Zool., I, 1894, p. 656 (Sirhassen).
Crocidura aagaardi Kloss, Journ. Nat. Hist. Soc. Siam, II, 1917, p. 283 (Patani, Peninsular Siam).

Panjang, 1 ♀.

This is a small, dark shrew with no brownish tinge and it is apparently not referable to any Bornean form. The skull is broken and an exact comparison is therefore not possible, but there seems no reason to separate this specimen from the Malayan animals described by Kloss as *C. aagaardi*.

External measurements (taken in the flesh).—Head and body, 91; tail, 60; hind-foot (s.u.), 14.5; ear, 10 mm.

Skull.—Upper tooth-row, 10.2; greatest breadth of rostrum, 7.0; mandible including incisor, 15.1 mm.

Galeopterus variegatus natunæ (Miller).

Galeopithecus volans, Thos. and Hart., Nov. Zool., I, 1894, p. 657 (specimens from Bunguran only); Thos. and Hart., op. cit., II, 1895, p. 489 (Bunguran); Miller, Proc. Wash. Acad. Sci., III, 1901, p. 134 (specimens from Bunguran only).
Galeopithecus natunae Miller, Smiths. Misc. Coll., XLV, 1903, p. 50 (Bunguran Island, North Natuna Islands).
Galeopterus natunae, Thos., Ann. Mag. Nat. Hist. (8) II, 1908, p. 303 (Natuna Islands and Borneo).
Galeopithecus variegatus natunae, Chasen and Kloss, Bull. Raff. Mus., 2, 1929, p. 17 (Bunguran and Anamba Islands).

Bunguran, 2 ♂, 2 ♀ (also 1 ♀, Bunguran, June 1894, coll. E. Hose).

The Bunguran form of *Galeopterus* was the first race of medium size to be described and on size alone can be distinguished from the larger races inhabiting Java, Sumatra and the Malay Peninsula. In colour both sexes seem exactly like the Malayan *peninsulae*, the sexual differences being very well marked. The males are rather richly coloured, but similar examples occur in Singapore: one specimen has the white spots on the upper parts unusually large.

The swollen lachrymal region noted by Miller in the type

of *natunae* appears to be only an individual character. It is noticeable in two skulls from Bunguran, but a similar condition is also found in other races of *Galeopterus*.

A race from South-eastern Borneo[1] has been described as *G. borneanus* but the characters given for its separation from *natunae* ("the interorbital constriction is wider, the brain-case decidedly wider, the nasals more pinched up into a ridge, and the rostrum deeper; audital bullæ of about the same size, the palate, posterior nares, and interpterygoid space decidedly wider in the Bornean form") seem essentially individual in this very variable animal. No exact topotypes of *borneanus* have been examined, but on the available material animals from Sarawak, British North Borneo and Banguey Island (North Borneo) are inseparable from *natunae:* in colour, size and cranial characters all seem essentially alike.

(For measurements *see* page 41).

Galeopterus variegatus gracilis (Miller).

Galeopithecus volans, Thos. and Hart., Nov. Zool., I, 1894, p. 657 (specimens from Sirhassen only); Miller, Proc. Wash. Acad. Sci., III, 1901, p. 134 (specimens from Sirhassen only).
Galeopithecus gracilis Miller, Smiths. Misc. Coll., XLV, 1903, p. 49 (Sirhassen Island, South Natuna Islands).
Galeopterus gracilis, Thos., Ann. Mag. Nat. Hist. (8), II, 1908, p. 303 (Sirhassen); Chasen and Kloss, Bull. Raffles Mus., 2, 1929, p. 19: footnote.

Sirhassen, 2 ♂, 4 ♀; Subi, 1 ♂, 1 ♀.

A rigid comparison of these specimens with a good series of topotypical *G. v. aoris*[2] fails to reveal any character of size or skull by which the two forms can be separated.

The specimens of *aoris* of which measurements are included in the detailed table on page 42 and the summary of measurements on page 25 are all adult and were chosen from a larger series because in each case they appeared, by age, to be comparable with the examples of *gracilis* listed above.

Although the table shows that in both races the female is slightly the larger of the sexes it will be seen from the detailed measurements that one female of *gracilis* (greatest length of skull, 63.9 mm.) is almost identical in its major dimensions with a male of *aoris* (No. 214/12): nevertheless, it cannot yet be shewn that *gracilis* is a smaller subspecies. Turning to the fur we find that the female of *gracilis* is of the usual grey colour, the single skin from Subi being the palest of the series. The juvenile male from Subi is exactly like the pale grey female from the same island. One of the males from Sirhassen is also grey

1. *Galeopterus borneanus* Lyon, Proc. U. S. Nat. Mus., xl, 1911, p. 124 (South-eastern Borneo).
2. *Galeopithecus aoris* Miller, Smiths. Misc. Coll., xlv, 1903, p. 47 ("Pulo Aor, off coast of Johore").

and cannot be separated from the females (this male is adult but as the teeth are unworn it is not included in the table of measurements). The other male from Sirhassen is certainly browner above than any female from that island, but it is less brown than the male of *aoris* and as Miller has stated that both the animals on which *gracilis* was founded are in the "grey phase" although they are sexed as male and female it seems that we have in *gracilis* a race in which the sexes are alike in colour, or not very different whereas in *aoris* the sexual dimorphism is well marked.

The acquisition of this series of *gracilis* proves that there is no foundation for the suggestions of Thomas (l.c.s.) and Chasen and Kloss (l.c.s.) that *gracilis* is the earliest name for a medium size race occupying the Natuna Islands and Borneo: it is a small race standing very near *aoris*.

(For measurements *see* page 42).

Galeopterus variegatus subspp. Summary of measurements given on page 42.

Measurement	Male		Female	
	aoris	*gracilis*	*aoris*	*gracilis*
Head and body (in the flesh) ..	316-327	300	345-379	327-360
Tail (in the flesh)	201-221	161[1]	194-222	215-245
Hind-foot (dry, c.u.)	57-60	56	58-65	63-65
Ear (in the flesh)	16-19	20	19-20	16-24
Skull				
Greatest length	62-65.4	61.2	65.4(c)-69.1	63.9-69
Condylo-basal length	59-61.8	58.2	63.4-65	60.8-66
Palatal length (lateral)	27.8-29.7	28.4	29.5-30.9	29.2-31.2
External biorbital breadth ..	40.2-40.6	41.8	40.8-42.4	40.5-43.2
Least interorbital breadth ..	13-16	14.9	15-15.9	15.7-17
Upper tooth-row (alveoli) ..	29.5-31.7	30.4	31.5-32.4	31.1-32.8
Palatal width at space between canine and first pre-molar ..	19.3-20.9	20	21.2-22.3	20-22.4

1. Examination of the skin suggests that this figure is too small: *Galeopterus* is a loosely made and rather difficult animal to measure in the flesh.

Pteropus vampyrus natunæ K. And.

Pteropus vampyrus, Thos. in Thos. and Hart., Nov. Zool., I, 1894, p. 655 (Bunguran); Thos. and Hart., op. cit., II, 1895, p. 489 (Bunguran and Pulau Panjang); Miller, Proc. Wash. Acad. Sci., III, 1901, p. 137 (Bunguran).
Pteropus vampyrus natunae K. And., Ann. Mag. Nat. Hist., (8), II, 1908, p. 369 (North Natunas; Sarawak).

Bunguran, 3 ♂.

This race does not differ from *P. v. malaccensis* in colour but it averages smaller.

The present specimens are all adult. The forearms measure 179, 190 and 193 mm. and the skulls, total length to gnathion, 76.7, 75, 72.5; palation to incisive foramina 36.5, 36. 35; front of orbit to tip of nasals, 25, 24, 25; zygomatic width, 40, 41.5, 43.5; upper teeth c-m², 28.5, 27, 28 mm.

P. v. natunae has not been recorded from the South Natunas.

Pteropus hypomelanus annectens K. And.

Pteropus hypomelanus, Thos. in Thos. and Hart., Nov. Zool., I, 1894, p. 655 (Sirhassen).

"? *Pteropus hypomelanus*" (part.), Miller, Proc. Wash. Acad. Sci., III, 1901, p. 137 (Sirhassen).

Pteropus hypomelanus annectens K. And., Ann. Mag. Nat. Hist. (8), II, 1908, p. 361 (Sirhassen).

Sirhassen, 1 ♂, 1 ♀; Panjang, 1 ♂, 2 ♀; Subi, 1 ♂, 1 ♀.

This is an extremely thin race and I cannot detect the slightest distinction in colour, in any phase, even based on the series, between *annectens*, and *lepidus* from the various islands included in the range of that form by Andersen.

Skin for skin the South Natuna examples can be matched by selected specimens of *lepidus* collected on Pulau Tioman and elsewhere. But the teeth of *annectens* are usually rather smaller than in *lepidus* and the skull with a known greatest length of 59.2–65.5 mm. against 62.5–67.5 mm. in *lepidus* is also somewhat smaller.

In the following table the forearm measurements were taken from the prepared skins and can only be regarded as approximate.

Locality	Sex	Forearm	Skull				
			Total length	Zygomatic width	Upper teeth c-m² (alveoli)	Front of orbit to tip of nasals	Remarks
							Adult
Panjang ..	♂	137	63	35.1	23.5	21.7	,,
Subi	♂	..	..	..	24.7	22	,,
Panjang ..	♀	..	59.2	31.6	22.5	20.2	,,
,, ..	♀	133	59.8	33.6	22.6	21	,,
Sirhassen ..	♀	129	..	..	22.6	20.1	,,
Subi	♀	..	59.7	31.4	22.3	20.3	,,

Macroglossus lagochilus lagochilus Matschie.

Sirhassen, 4 ♂, 2 ♀.

Forearms (adults).—♂, 40.6, 41.2; ♀, 41.7, 40.5 mm.

A *Macroglossus* skin taken on Bunguran, N. Natunas in June 1912, by Mr. V. Knight, has the nose much shrivelled and I do not care to proceed further with the identification: the forearm measures about 40 mm.

The bats of this genus are not common in Malaysia and there are few specimens in the Raffles Museum: they appear to be partial to mangrove swamps.

Rhinolophus trifoliatus trifoliatus Temm.

Bunguran, 1 ♂, 1 ♀.

Fur, brownish grey, wing membranes, bright brown, large yellowish spots on the elbows and knees. Free edge of the inter-femoral membrane tinged with yellow.

Measurements.—Forearm—, 49; 3rd metacarpal, 30, 33; III¹, 17.2, 19; III², 25.5, 28; 4th metacarpal, 35, 35; IV¹, 11,—; IV², 16, 16; 5th metacarpal,—, 37 (±); V¹, 12, 13; V², 17,—; lower leg, 23.5, 25; total length of skull (to front of canine), 22, 22.5; zygomatic breadth, 11.5, 11.5; upper teeth (to front of canine), 8.5, 8.9; mandible,—, 15 mm.

Rhinolophus borneensis nereis K. And.

Rhinolophus nereis K. Andersen, P.Z.S., 1905, p. 90; plate III, figs. 7, *a*, *b*, *c*. (Siantan Island, Anamba Islands).

Bunguran, 1 ♀.

Forearm, 46; 3rd metacarpal, 34; III¹, 13; III², 22; 4th metacarpal, 35; IV¹, 9; IV², 12; 5th metacarpal 35; V¹, 10; V², 10; lower leg, 21; tail, 18; total length of skull (to front of canine), 21; zygomatic breadth, 10.5; upper teeth (to front of canine), 8; mandible, 14 mm.

Andersen pointed out that *borneensis* of North Borneo occurs in the South Natunas in a form (*spadix*) only doubtfully separable from the typical race whereas in the more remote Anamba Islands certain modifications in structure appear, notably a decisive lengthening of III² and a shortening of IV¹. This form (*nereis*) forms a link between *borneensis* and *stheno* of the Malay Peninsula and it is most interesting to find that it occurs in the *North* Natuna Islands.

Rhinolophus borneensis spadix Miller.

Rhinolophus affinis, Thos. in Thos. and Hart., Nov. Zool., I, 1894, p. 656 (Sirhassen).

Rhinolophus spadix Miller, Proc. Wash. Acad. Sci., III, 1901, p. 136 (Sirhassen).

Sirhassen, 15 ex. (♂, ♀).

The fur is either very bright in colour, near Sanford's brown, or duller and nearer russet.

The forearms measure 42.5–44.5 mm. and the ears 17–18 mm. The few examples of typical *borneensis* available for comparison have the forearm measuring 42–44 mm., and with a maximum forearm length of 46.3 mm. (*fide* Andersen, P.Z.S., 1905, p. 88) *spadix* seems to average very slightly larger but the material is scanty and the races need confirmation. Furthermore, the exact locality of the specimens of *spadix* with the longest forearms has not been stated and they may therefore be from the Karimata Islands, which Andersen included in the range of *spadix*, and not exact topotypes of the subspecies.

Hipposideros larvatus (Horsf.).

Hipposideros larvatus, Miller, Proc. Wash. Acad. Sci., III, 1901, p. 135 (Sirhassen).

Sirhassen, 3 ♀.

Forearms.—60.7; 62.7 mm.

Hipposideros galeritus galeritus Cantor.

Sirhassen, 1 ♂, 1 ♀.

Forearms.—49.8; 47 mm.

Hipposideros diadema subsp.

Bunguran, 1 ♀.

This single specimen with a forearm of 88 mm. in length is larger than any example of *H. d. vicarius* And. available for comparison and it also differs in that the fur is everywhere washed with orange.

Pipistrellus subulidens Miller.

Pipistrellus subulidens Miller, Proc. Wash. Acad. Sci., III, 1901, p. 135 (Sirhassen).

Sirhassen, 2 ex.

Although one of these bats has the inner upper incisors bifid, the others agree so closely with the description of *P. subulidens* that all are referred to that form. At the same time it must be stated that these Sirhassen specimens agree so closely with bats from Sumatra identified by the late Oldfield Thomas as *P. tralatitius* Horsf., that without a more detailed examination than is profitable at the moment in view of the confused state of this group in Malaysia they cannot be separated.

Forearms.—43.9, 43.6 mm.

Myotis (Leuconoe) adversus (Horsf.).

Sirhassen, 1 ♂.

Forearm.—38 mm.

Myotis muricola (Hodgs.).

Vespertilio muricola, Thos. in Thos. and Hart., Nov. Zool., I, 1894, p. 656 (Bunguran).

Sirhassen, 2 ex.

Forearm.—32.4 mm.

Megaderma spasma trifolium Geoff.

Sirhassen, 5 ♂, 3 ♀.

Forearms.—♂ 57.7, 58.2, 59; ♀ 58.7 mm.

Not the larger *M. spasma natunae* And. & Wr., of Bunguran, North Natuna Islands.

Pygathrix pyrrha vigilans (p. 6). *P. siamensis natunae* (p. 7).

Species and locality	Sex	Head and body (in the flesh)	Tail (in the flesh)	Hind-foot, s.u. (in the flesh)	Skull				Remarks
					Greatest length	Basal length	Zygomatic breadth	Maxillary tooth-row with canine (alveoli)	
Pygathrix pyrrha vigilans									
Sirhassen	♀	525	790	155	94·4	69·5	74	30·9	Adult
"	♀	455	735	150	97·9	68·3	72·3	31·5	"
Pygathrix siamenis natunae									
Bunguran	♂	415	605	153	88·2	57·2	69	27	Adult
"	♀	455	625	150	88	58·4	69·5	27·5	"
"	♀	481	614	155	87·8	58·8	70·2	27·5	"

Tragulus kanchil everetti (p. 11). *T. k. abruptus* (p. 12). *T. javanicus bunguranensis* (p. 10). *T. j. abjectus* (p. 11).

Species and locality	Sex	Head and body (in flesh)	Tail (in flesh)	Hind-foot and hoof (dry)	Skull								REMARKS
					Greatest length	Condylo-basal length	Palatal length (interal)	Diastema	Upper molar row (alveoli)	Median nasal length	Inter-orbital breadth	Zygomatic breadth	
Tragulus kanchil everetti													
Bunguran	♂	415	60	115	94·7	87·6	50·4	7·5	35·2	28·5	26·8	43·9	Adult
"	♂	435	65	112	..	..	..	..	34·5	..	27·8	43	"
"	♂	468	62	120	95·4	90·2	51·9	10·1	33	28·4	27·5	44·3	"
"	♀	469	56	121	96·2	90·2	51·9	10·5	32·5	29·5	27·5	44	"
Tragulus kanchil abruptus													
Subi	♂	..	..	114	95·5	90·5	52·5	7·6	32·9	24·2	26·6	44·7	Adult [type]
"	♂	..	..	112	94·4	89·3	51·3	7·7	..	23·9	24·5	40·4	Post. molar erupting
Tragulus javanicus bunguranensis													
Bunguran	♂	513	72	138	112	102	59·7	10·2	39·7	30·3	30·5	47·4	Adult
"	♀	605	75	141	124	115·5	68·7	16·1	40·2	37·3	31·1	51	"
Tragulus javanicus abjectus													
Sirhassen	♂	495	70	126	107·5	101·2	60·1	10·5	36·5	30·4	29·3	47·8	Adult [type]
"	♂	..	..	120	94·2	88	50·7	8·8	22·5	29	26·7	43·4	Immature

Ratufa affinis bunguranensis (p. 14). *Ratufa affinis sirhassenensis* (p. 14).

Species and locality	Sex	Head & body	Tail	Hind-foot, s.u.	Ear	Skull: Greatest length	Skull: Condylo-basilar length	Skull: Palatilar length	Skull: Diastema	Skull: Upper molar row (alveoli)	Skull: Median nasal length	Skull: Interorbital breadth	Skull: Zygomatic breadth	Remarks
Ratufa affinis bunguranensis														
Bunguran	♂	305	385	68	26	61.6	51.9	23.3	12.6	11.9	20.4	23.7	37.5	Adult
"	♂	315	400	66	25	64	53.3	24.3	13.3	12.3	21	25.5	38.7	"
"	♂	310	370	67	24	61	51.2	22.7	12.7	11.8	19.1	23.2	38.9	"
"	♂	315	410	69	25	65.9	54.4	23.6	13.9	12.7	22.4	27	42	"
"	♀	305	375	71	24	62.2	51.3	24	13.7	12.5	19.2	24.8	39.5	"
"	♀	320	380	70	27	63.3	53.6	24.2	12.7	12.8	19.2	24.6	39	"
Ratufa affinis sirhassenensis														
Sirhassen	♂	..	..	..	..	58.5	48.8	23	11.8	12.3	18.4	23	37.3	Adult
"	♂	..	..	..	..	57.9	48.8	23.1	12.5	12	19	22.3	36.6	"
"	♂	..	..	..	..	59.5	48.7	22.4	12.2	12.1	19	23.2	36.4	"
"	♂	..	..	..	..	60	50.4	23.5	12.8	12	..	24.2	37.8	"
"	♀	..	..	..	..	60.8	50.3	22.5	12.7	11.8	17.9	24.5	38.9	"
"	♀	..	..	..	..	57.9	48.6	22.4	12.5	11.8	19.3	23.3	38.4	"

Sciurus prevosti navigator (p. 14).

Species and locality	Sex	Skull: Greatest length	Skull: Condylo-basilar length	Skull: Palatilar length	Skull: Diastema	Skull: Upper molar row (alveoli)	Skull: Median nasal length	Skull: Inter-orbital breadth	Skull: Zygomatic breadth	Remarks
Sciurus prevosti navigator										
Sirhassen	♂	48.8	42.2	20.1	11	9.6	15	17.9	30	Adult
"	♂	47.8	..	20.1	10.7	9	13.8	16.9	29.5	"
"	♀	48.8	41.5	20.8	11.6	9.1	14.3	17.8	29.5	"
Panjang	♂	49.9	42.4	21.9	11.9	10.4	14.2	19.3	29.1	"
"	♂	49.4	42.2	20.4	11.2	10.4	14.3	19.2	29.7	"
"	♀	49.5	42	22.6	11.8	9.7	14.2	19.2	29.6	"
Subi	♂	48.2	41	20.1	11.5	9.1	13.2	18.3	28.5	"
"	♀	48.6	42.2	20.2	11.1	9.5	14.1	18.2	29.5	"
"	♂	50.2	43.5	21	11.7	9.1	14.2	19.4	30.1	"
"	♂	48.7	42.2	20.5	11.1	9.4	14.4	18.4	29.1	"
"	♀	49	42	20.7	11.2	9.4	14.4	18.3	27.7	"

Sciurus notatus rubidiventris (p. 13). *S. notatus lutescens* (p. 16).

Species and locality	Sex	Head and body	Tail	Hind-foot (s.u.)	Ear	Skull: Greatest length	Condylo-basilar length	Palatilar length	Diastema	Upper molar row (alveoli)	Median nasal length	Interorbital breadth	Zygomatic breadth	Remarks
Sciurus notatus rubidiventris														
Bunguran	♂	207	158	41	15	51.5	44.1	22.7	11.6	9.4	15.6	19.2	32.2	Adult
" .. .	♂	196	171	45	17	50.2	43.2	22.1	11.9	8.8	14.1	17.5	31	"
"	♂	198	173	45	16	51.4	43	22	11.3	..	14.5	18.5	30.2	"
"	♂	200	175	45	17	50.6	42.2	21.2	11.6	9.5	15.7	18.6	30.2	"
"	♂	195	165	44	19	50	42.2	21.5	10.9	9.3	15.5	18.4	30.1	"
"	♂	201	172	46	16	51.5	44	21.7	11.2	9.2	15.1	..	..	"
"	♂	194	178	47	17	51.3	43.8	22.3	11.9	9.2	15	18.6	31.4	"
"	♀	199	197	46	17	51.2	44.1	22.3	11.5	9.9	15	17.3	..	"
"	♀	200	160	45	15	51.9	43.7	22.5	11.8	9.6	15.5	17.6	30.8	"
"	♀	203	..	44	17	51.8	43.3	21.7	12.2	8.8	15	18.6	31	"
Sciurus notatus lutescens														
Sirhassen	♂	195	155	..	..	45.1	38.1	19	9.6	8.5	12.3	15.5	26.8	Adult
"	♂	180	162	..	..	45.2	38.2	19.2	10.5	7.9	12.8	15.6	27	"
"	♂	190	182	..	..	45.8	39.3	19.1	9.3	8.7	12.7	17.2	27.2	"
"	♂	190	160	..	..	46.5	39.1	19.8	10.2	8.5	12.8	15.9	27.4	"
"	♀	..	..	..	..	44.4	37.3	18.8	9.9	8.2	12.7	14.9	26.5	"
"	♀	168	162	..	..	45	38.7	19.8	9.7	9	12.4	15.8	25.7	"
"	♀	180	162	..	..	45.3	39	19.2	10.2	8.3	12.5	15.6	26.7	"
Berian	♂	..	..	..	..	44.5	38.5	18.8	9.1	8.7	12.6	15.3	25.6	"
"	♀	172	162	..	..	45.3	38.3	19.2	10	8.3	13.2	16.2	26.6	"
		195	165	..	..	46.7	39.2	19.5	10	8.8	13.9	16.4	27.4	"

Sciurus notatus rutiliventris (p. 13). *S. tenuis procerus* (p. 16).

Species and locality	Sex	Head and body	Tail	Hind-foot (s.u.)	Ear	Skull: Greatest length	Condylo-basilar length	Palatilar length	Diastema	Upper molar row (alveoli)	Median nasal length	Inter-orbital breadth	Zygomatic breadth	Remarks
Sciurus notatus rutiliventris														
Sedanau	♂	169	167	43	16	47.8	40.9	20.6	10.2	8.8	13.2	17	27.2	Adult
"	♀	175	160	42	14	48.5	40.2	20.4	11.1	8.2	14	16.5	28	"
"	♀	190	155	42	15	48.6	41.1	20.9	11.1	8.8	14.8	16.8	28.4	"
"	♀	194	164	43	15	50	41.9	21.2	10.8	9.2	14.9	17.4	29	"
"	♀	181	147	43	16	47	39.8	20.1	10	8.8	13.8	16.2	26.9	"
"	♀	191	164	45	17	50.4	42.4	21.2	10.9	9.2	14.3	16.7	28	"
"	♀	189	161	44	16	48.5	40.9	21	10.8	9	14.2	15.9	27.3	"
Sciurus tenuis procerus														
Bunguran	♂	128	105	31	14	36.4	29.6	14.6	7.8	6.3	10.6	12.5	22.2	Adult
"	♂	134	..	33	14	36	29.7	14.9	7.5	6.7	10.5	12.6	22.3	"
"	♂	135	102	33	13	..	30.1	15.7	7.8	6.5	10.2	12.4	..	"
"	♂	133	110	30	13	35.5	29.1	14.4	7.2	6.2	9.5	11.9	21.5	"
"	♀	122	108	32	13	35.9	29.1	14.5	7.5	6.5	9.7	11.8	21.7	"
"	♀	135	98	29	13	36.3	29.7	14.7	7.7	6.3	10	13.2	22.7	"
	♀	125	107	30	13	36.1	29.4	14.9	7.8	6.4	9.7	22.4	22.6	"

Sciurus lowi natunensis (p. 17).

Species and locality	Sex	Head and body	Tail	Hind-foot (s.u.)	Ear	Skull: Greatest length	Condylo-basilar length	Palatilar length	Diastema	Upper molar row (alveoli)	Median nasal length	Interorbital breadth	Zygomatic breadth	Remarks
Sciurus lowi natunensis														
Bunguran	♂	132	91	32	15	37	30.7	15.1	7.9	7	10.5	11.1	21.5(c)	Adult
,, ...	♂	130	89	31	13	..	31.7	15.8	8.7	6.4	10.8	11.4	22.1	,,
,, ...	♀	136	73	31	13	36.8	30.6	15.2	8.2	6.2	10.8	12.4	22.5	,,
,, ...	♀	135	90	33	14	..	..	16.2	8.6	6.9	11.1	11.8	22.8	,,
,, ...	♀	136	..	32	13	37.2	31.4	15.4	8.5	6.3	10.6	12.3	22.8	,,
Sirhassen	♂	130	85	..	15	37	30.6	15.5	8.5	6.8	10.4	11.5	21.5	,,
,, ...	♂	132	83	..	15	36.6	30.3	15.5	..	..	10.4	11	..	,,
,, ...	♀	130	75	..	12	35.8	30.1	15.2	8.4	6.9	10.1	11	21.5	,,
,, ...	♀	144	76	..	14	37.5	31.8	16.1	9	6.8	10.5	11.5	21.2	,,

Rattus sabanus bunguranensis (p. 17). *Rattus rattus luxuriosus* (p. 20). *Rattus rattus pauper* (p. 20).

Species and locality	Sex	Head and body	Tail	Hind-foot, (s.u.)	Ear	Skull: Greatest length	Condylo-basilar length	Diastema	Upper molar row (alveoli)	Median nasal length	Interorbital breadth	Zygomatic breadth	Length of palatal foramina	Remarks
Rattus sabanus bunguranensis														
Bunguran	♂	..	..	..	..	59.2	50.2	16	9.8	24.2	9.5	26.7	8.7	Adult
,, ...	♀	247	346	44	28	56.5	48.6	14.9	9.5	21.8	8.7	26.4	7.6	,,
,, ...	♀	239	381	45	27	56.2	48.1	15.4	9.8	22.3	9.4	26.5	7.3	Adult [type]
Rattus rattus luxuriosus														
Bunguran	♂	182	..	31	20	43.1	37	11.8	7	15	6.4	19.8	7.7	Adult
,, ...	♂	176	166	33	20	42.8	37.7	12.2	6.7	15.3	6.7	20.9	7.8	Adult [type]
Sedanau	♂	168	196	35	21	42	37.1	11.3	6.7	15.1	6.5	20.1	7.3	Adult
Pulau Pasir	♂	178	182	32	21	42.8	37.7	11.2	7	15.3	6.2	20.7	7.5	,,
Bunguran	♀	171	171	32	21	42.5	37.5	11.8	6.8	15.4	6.5	20.2	7.7	,,
,, ...	♀	190	175	34	22	43.7	38.4	12	7.2	15.2	6.5	20.8	8.2	,,
Sedanau	♀	177	184	32	20	42.4	37	11.4	6.5	15.3	6.3	20.4	7.3	,,
,, ...	♀	169	191	33	21	44.1	37.9	12.1	7	16.5	6.8	21.8	7.5	,,
Pulau Pasir	♀	174	175	34	22	43.3	38.1	11.8	6.7	15.7	6.4	21.2	7.9	,,
Rattus rattus pauper														
Sirhassen	♂	193	170	35	21	39.8	35.2	10.8	6.5	14.2	6.4	19	6.1	Adult
,, ...	♂	190	170	32	21	39.6	35.3	10.7	6.9	13.5	5.9	19.2	6.2	,,
,, ...	♀	183	162	34.7	22	40.7	34.9	10.5	7	13.8	6.2	20.3	6.7	,,
,, ...	♀	185	170	33.8	21	40.3	35.6	11.3	6.5	14.2	6.3	19.8	6.7	,,
Panjang	♂	167	180	35	20	41.2	35.8	11	6.5	14.9	6.4	18.6	6.4	,,
,, ...	♀	170	160	34	19	42.3	36.7	12	6.7	..	6.5	19.5	6.7	,,
Subi	♂	..	..	..	..	39.5	34.5	10.1	6.6	13.9	6.2	18.4	6.3	,,

Rattus concolor ephippium (p. 21). *R. surifer lingensis* (p. 19).
R. rajah hidongis (p. 18).

Species and locality	Sex	Head & body	Tail	Hind-foot	Ear	Skull: Greatest length	Condylo-basilar length	Palatilar length	Diastema	Upper molar row (alveoli)	Median nasal length	Interorbital breadth	Zygomatic breadth	Remarks
Rattus concolor ephippium														
Panjang	♂	121	128	24	17	32.2	26.8	14.2	8.2	4.9	11.8	4.8	..	Adult
"	♂	114	141	24	16	32.1	27.1	14.2	8.2	4.7	11.9	4.7	14.1	"
Panjang	♀	111	126	23	16	32.2	27.2	13.8	7.4	..	11.8	4.8	14.1	"
Bunguran	♀	131	135	23	17	32.8	27.6	14.5	8.2	4.9	11.8	5.1	15.5	"
Rattus surifer lingensis														
Bunguran	♂	208	202	42	25	50.5	42.2	20.7	13.2	7.8	18.7	7.5	23	Adult
"	♂	220	..	44	25	50.2	42	21.1	14.7	6.5	18	7.2	22.4	"
"	♂	191	185	40	24	..	38.2	19	12.8	6.4	17	7.4	21.4	"
"	♀	201	182	39	27	49.5	40.8	20.1	13.1	6.7	17.4	7.5	22.4	"
"	♀	210	..	40	25	48.2	40.2	20	13.2	6.5	18.9	7.4	21.9	"
"	♀	215	..	40	25	..	..	20.4	14.6	6.5	19	7.7	21.8	"
"	♀	200	..	39	25	47.9	40.5	19.4	13	6.7	17.1	7.5	22	"
Rattus rajah hidongis														
Sirhassen	♂	190	155	40	24	46	38.5	19.5	12.2	7.5	17.5	7.3	20.6	Adult
"	♀	205	..	39	24	47.4	39.1	19.7	12.5	6.9	19.3	7.3	20.5	"
"	♀	173	147	40	23	41.7	35.5	18.4	11.4	6.6	16.7	7.3	19.8	"
"	♀	173	137	39	20	40.6	34.4	17.6	10.4	7.1	15.6	7.2	19.3	"
"	♀	188	152	38	23	44.3	37	18.2	11.7	7.3	16.6	6.9	20.6	"
"	♀	215	170	35	..	47.5	40.5	21.1	13.5	7	18.9	8.1	20.5	"

Rattus whiteheadi batamanus (p. 19). *Rattus mülleri integer* (p. 21).
Rattus m. firmus (p. 21).

Species and locality	Sex	Head and body	Tail	Hind-foot, (s.u.)	Ear	Skull: Greatest length	Condylo-basilar length	Palatilar length	Upper molar row (alveoli)	Median nasal length	Inter-orbital breadth	Zygomatic breadth	Diastema	Remarks
Rattus whiteheadi batamanus														
Sirhassen	♂	130	..	30	20	36	30.7	14.3	5.8	12.3	6.1	16.3	8.5	Adult
"	♂	127	115	28	20	36.6	31	14.7	6	12.5	6.1	16.8	8.6	"
"	♂	145	116	31	20	34.6	29.1	13.8	5.6	11.9	6.1	16.3	8.5	"
"	♂	144	..	29	20	36.2	30.6	14.6	5.7	11.4	6.3	16.7	8.6	"
"	♂	131	123	30	20	36.5	31.4	14.7	5.7	12.9	6	16.8	9.2	"
"	♀	134	112	29	20	35.1	29.2	13.9	5.8	..	5.7	16.1	8.1	"
Rattus mülleri integer														
Sirhassen	♂	232	231	44	23	55.1	46.7	24.6	9.2	21.5	8.5	27.1	14.3	"
"	♂	230	225	45	26	53.6	46.2	23.9	9.3	22	7.8	25.5	14.3	"
Rattus mülleri firmus														
Bunguran	♂	232	270	49	24	..	..	..	10.2	..	7.8	..	..	"

Tupaia tana sirhassenensis (p. 22). *Tupaia glis natunae* (p. 22).

Species and locality	Sex	Head & body	Tail	Hind-foot (u. s.)	Ear	SKULL							Remarks
						Greatest length	Basal length	Palatal length	Upper molar row (alveoli)	Tip of premaxilla to lachrymal notch	Interorbital breadth	Zygomatic breadth	
Tupaia tana sirhassenensis													
Sirhassen	♂	219	..	46	..	60.5	52.4	33.5	17.2	29.3	15.5	28.2	Adult
"	♂	200	150	..	..	58.7	51	32.7	17.1	28.4	15.4	27.3	"
"	♂	209	133	..	..	58.2	50.2	31.6	16.7	27.6	15	27.2	"
"	♂	200	160	44	..	59.5	51.9	32.7	17.3	28.3	15.4	26.8	"
"	♀	210	155	40	..	59.8	51.8	33.1	18	29.2	15.4	27.8	"
"	♀	200	155	42	..	59.8	51.8	33	17.3	29	15.8	28.4	"
"	♀	211	162	41	..	57	50.4	32.2	16.4	26.8	14.9	26.6	"
"	♀	201	141	41	..	56.8	49.2	31.5	16.3	27.3	14.9	26	"
Tupaia glis natunae													
Bunguran	♂	181	141	39	18	..	..	..	16.5	..	14.7	26.8	Adult
"	♀	172	134	38	18	51.9	44.9	28	16.3	22.5	14.9	25.6	"
"	♀	177	139	40	16	52	44.2	27.5	15.8	22	14.5	25.6	"

Galeopterus variegatus natunae (p. 23).

Localities	Sex	Head & body (in the flesh)	Tail (in the flesh)	Hind-foot (dry, c. u.)	Ear from meatus (in the flesh)	SKULL							Remarks
						Greatest length	Condylo-basilar length	Palatal length (lateral)	External bi-orbital breadth	Least inter-orbital breadth	Upper tooth-row (alveoli)	Palatal width at space between canine and first premolar	
Bunguran ..	♂	355	185	65	19	67	63.2	30.8	43.2	16	32	20.9	Adult
" ..	♂	375	190	67	20	68.5	66.4	32.6	45.8	17.2	33.4	22.4	"
" ..	♀	386	234	66	19	70.4	67.8	33.5	45.8	18.4	32.4	21.2	"
" ..	♀	400	280*	68	22	73.1	68.2	33.2	48.1	20.2	34	22.4	"
" ..	♀	..	..	..	..	..	68.2	..	43.6	18.2	31.4	20	"

* This seems an exceptionally long tail, but the field-measurement taken in the flesh is confirmed by the skin.

Galeopterus variegatus subspp. (p. 24).

Localities	Sex	Head and body (in the flesh)	Tail (in the flesh)	Hind-foot (dry, c. u.)	Ear from meatus (in the flesh)	Skull							Remarks
						Greatest length	Condylo-basal length	Palatal length (lateral	External bizygomatic breadth	Least inter-orbital breadth	Upper tooth-row (alveoli)	Palatal width at space between canine and first pre-molar	
Galeopterus v. aoris													
Aor	♂	322	221	58	16	65·4	61·8	29·7	40·5 (c)	16	29·5	20·9	Adult
,, ...	♂	327	201	57	17	63·9	60	29·6	40·6	13	31·7	19·7	,,
,, ...	♂	316	216	60	19	62	59	27·8	40·2	15·8	29·6	19·3	,,
,, ...	♀	370	222	65	20	69·1	65	30·9	42·4	15	32·4	22·3	,,
,, ...	♀	345	209	58	19	65·4 (c)	63·4	30·1	40·8	15	31·5	21·2	,,
,, ...	♀	379	194	58	19	66·5	63·6	29·5	41·3	15·9	31·6	21·8	,,
Galeopterus v. gracilis													
Sirhassen	♂	300	161	56	20	61·2	58·2	28·4	41·8	14·9	30·4	20	Adult
,, ...	♀	327	225	63	21	63·9	60·8	29·2	40·5	17	31·1	20	,,
,, ...	♀	360	215	63	23	..	64·5	31·2	..	16·5	32·3	20·8	,,
,, ...	♀	350	245	64	24	69	66	30	43·2	17	32·6	21·2	,,
Subi	♀	340	240	65	16	69	62·5	30·9	43·2	15·7	32·8	22·4	,,